# Chapter 10: Regulation

## Introduction

To understand how government regulation will play a role in the commercial space sector's debris-reduction effort, it is necessary to understand the Federal regulatory approach to the commercial sector, as well as the different types of regulation. Following an overview of regulatory authority, this chapter will outline a basic approach for integrating commercial regulation with other debris-mitigation efforts.

## I. Regulatory Overview

Most federal regulation falls within one of the following categories: (a) the direct control of commerce and trade under a program of economic regulation, (b) the protection of public health and safety and the environment, and (c) the proper management and control of federal funds and federal property. The functions and authority of the three principal federal agencies involved in the regulation of commercial space activities — i.e., DOT, the Federal Communications Commission (FCC), and the DOC, NOAA—fall into all three categories of regulation.

The authority of both the FCC and NOAA concerns the first category: the regulation of business activities principally for economic reasons. In contrast, DOT and FCC are charged by statute with carrying out the second category of regulation: DOT regulates the commercial launch sector to protect public health and safety, as well as other public interests, and the FCC regulates communications by wire and radio for the purpose of promoting safety of life and property. The FCC's authority also falls into the third category in that it manages and controls the private sector's use of the national radio frequency spectrum, a public good.

The Communications Act of 1934 confers on the FCC the authority to regulate interstate and foreign commerce in communications by wire and radio. The FCC's authority includes the responsibility for allocating radio frequencies and managing their use. The FCC's role in regulating commercial space activities derives from this authority and involves licensing providers of telecommunications services (which may include satellites), assignment of orbital positions consistent with international treaties, and establishment of standards governing transmitter design and operation to ensure appropriate frequency usage (e.g., spacecraft control pointing accuracy and position tolerance). To carry out these responsibilities, the FCC authorizes the construction, launch, and operation of U.S. commercial communication satellites in geostationary, and non-geostationary satellite orbits, while at the same time recognizing DOT's responsibility for safety issues associated with payload launch operations and launch mission.

NOAA's authority with respect to commercial space activities is granted under Title II of the Land Remote-Sensing Commercialization Act of 1992 (which repealed the Land Remote Sensing Commercialization Act of 1984). NOAA is responsible for licensing private remote-sensing space systems to stimulate the development of a U.S. land remote-sensing industry and to promote the continuous collection and utilization of land remote-sensing data while maintaining U.S. leadership in civil remote sensing and fulfilling U.S. international defense and security commitments. Section 202(b)(4) of Title II requires all licenses to include a condition under which the licensee must "upon termination of operations under the license, make disposition of any satellites in space in a manner satisfactory to the President." This clearly provides adequate authority to require that a spent spacecraft not be left in a position that contributes to the space debris problem. Presumably, any reasonable combination of design and orbital conditions could be imposed to promote the desired disposition. By implication, authority to control the disposition of the entire spacecraft would include authority to impose reasonable conditions directed at maintaining a spacecraft intact during operations (i.e., in orbit) or controlling the disposition of any pieces shed during operations. NOAA's authority under Title II does not extend to activities that are part of the launch.

The principal purpose of the authority granted to the Secretary of Transportation under the Commercial Space Launch Act of 1984, as recodified at 49 United States Code Subtitle IX, chapter 701 (the Act), is to oversee and coordinate the conduct of commercial space launch operations in a manner that protects the important national interests associated with such activities: public health and safety, safety of property, U.S. national security and foreign policy interests. The Secretary is empowered to issue licenses authorizing the conduct of commercial launch activities and to

establish the regulatory regime for ensuring that they are conducted safely and responsibly. In the course of devising appropriate regulatory guidance, the Secretary may, by regulation and in consultation with other appropriate agencies, eliminate any existing federal requirements otherwise applicable to commercial launch activities that are determined to be unnecessary to protect national interests. The Secretary may also add new requirements to safeguard those interests or to ensure compliance with U.S. international obligations.

DOT's charter as a safety regulatory agency encompasses all non-government launches conducted by U.S. citizens or from U.S. territory, payloads involved in launches subject to DOT licensing requirements, and non-U.S. Government launch sites (e.g., privately operated or state-run spaceports). With specific regard to non-government payloads on non-governmental launch vehicles, proposals to launch payloads that are not subject to licensing by another U.S. Government agency must be regulated by DOT from the standpoint of the national interests that the Department is charged with protecting. If a proposal runs counter to those interests (i.e., would jeopardize public health and safety, safety of property or U.S. national interests), DOT can prohibit the launch of the payload in question.

DOT's broad, general authority over satellites does not extend to those subject to (a) licensing and regulation by the FCC under the Communications Act of 1934 or (b) licensing by NOAA under the Land Remote-Sensing Commercialization Act of 1992. To the extent that a payload requires a license under either of these regimes in order to be launched, DOT may not duplicate the review process of either of those agencies or reconsider the merits of the specific service to be provided pursuant to the license. Nevertheless, DOT continues to have authority to ensure the safety of commercial launch operations involving these otherwise licensed payloads.

Regulatory oversight of the commercial space launch sector for the purpose of preventing and controlling orbital debris would fall into the "safety" category of regulatory functions. As noted above, DOT is expressly authorized to regulate commercial launch activities in terms of public safety and other public interests, and the FCC is expressly authorized to regulate the use of radio to make available an efficient nationwide, and worldwide, radio communication service.

Within the limits of their authority, regulatory agencies may structure their relationship for space purposes in a manner comparable to the existing alignment for terrestrial activities. For example, the FCC regulates mobile land, marine, or airborne radio communications systems and service, while DOT regulates modes of transport (e.g., truck, ship, or aircraft) by which the service is provided. In addition, similar to the way in which the FCC regulates the painting of radio towers consistent with FAA air navigation requirements, the FCC may regulate the physical movement of spacecraft to assure the continued availability of efficient satellite-based services. In terms of space-related activities, therefore, the economic focus of NOAA and the regulatory focus of the FCC on the provision of telecommunication services would continue to be distinguished from DOT's focus on the safety and transportation components of the launch of vehicles and spacecraft.

In 1990, DOD, NASA, and DOT completed an Orbital Debris Research Plan designed to coordinate the research efforts of the respective agencies. The results are reported in chapters 1 through 7. Discussions continue between the agencies on an approach that best facilitates completion of identified research tasks. Safety research of DOT, therefore, will be used to identify the regulatory options and standards that may guide future industry practices.

## II. Department of Transportation Approach

DOT evaluates space debris issues consistent with its congressional authorization to license and regulate commercial launch activities in a manner that ensures protection of public health and safety, safety of property and other U.S. interests. These issues are addressed through ongoing regulatory action in the following areas: (a) licensing and enforcement, (b) safety and regulatory research and standards development, and (c) financial responsibility / insurance requirements and risk allocation regimes.

### A. Licensing and Enforcement

Through the license application review process, DOT examines proposed commercial launch activities. Safety Review and Mission Review procedures address, among other things, issues of orbital safety and, by implication, orbital debris in the following manner:

- Review of ELV staging and maneuvering hardware reliability, including safety impacts of vehicle operational performance statistics on previous failures and the failure mode and effect analysis.
- Review of elements involved with proposed mission planning and design, including the proposed trajectory, separation maneuvers, orbital

insertion, orbital life of proposed geo-transfer and parking orbits, and the potential for on-orbit collisions.
- Review of the license application to ensure that operational plans are consistent with U.S. Government recognized safe practices or otherwise address orbital safety concerns (i.e., venting of propellants and pressurants in orbiting spent stages to preclude explosions, separation maneuvers to avoid collisions, and satellite position management for end-of-life disposal).

Through its review of mission planning and design, DOT considers an applicant's proposal for minimizing risks to public safety. DOT requires that launch operators consider and address orbital debris issues through such means as on-orbit risk analysis. DOT has observed a growing understanding and heightened appreciation of orbital debris among U.S. commercial launch services providers.

As part of the mission review process, DOT coordinates with other government agencies to determine whether a launch proposal would present a threat to U.S. interests or public safety. A 1991 agreement between DOT and the USSPACECOM, which calls for the mutual exchange of data, contributes to the DOD's efforts to track objects in Earth orbit. Under the Commercial Space Transportation Licensing Regulations, 14 CFR chapter III, commercial launch operators are required to provide information on U.S. objects in space as a result of a launch event. The information is then relayed to the United Nations via the Department of State in accordance with the Convention on Registration of Objects Launched into Outer Space.

### B. Regulatory and Safety Research and Standards Development

Under Executive Order 12866, "Regulatory Planning and Review," agencies are directed to consider the economic impacts of available regulatory alternatives through quantitative and qualitative measures of costs and benefits. In compliance with this established federal guideline, proposed commercial space transportation safety regulatory measures are extensively examined by DOT.

The DOT research program addresses a wide array of safety issues involving commercial launch ranges and launch service operations, as well as methods to evaluate the safety of reentries of objects from space, both normal and accidental, as well as natural and controlled. To date, research has focused on the impact of commercial launch operations on public safety, i.e., prelaunch vehicle preparation, vehicle stage separation, and payload orbit insertion, as well as the methodologies for identifying and analyzing risks. For example, research programs have evaluated how licensed commercial launch vehicles may affect proposed low Earth orbit constellations, as well as reentry risks resulting from commercial launch events. Future research efforts may examine the relative effectiveness, cost, and benefit of various proposed debris prevention and control options involving vehicle and operational practices.

### C. Financial Responsibility and Insurance Requirements

DOT has the authority to require that a license applicant demonstrate financial responsibility as a condition of a licensed launch. The purpose of safety standards is to reduce the incidence of accidents, whereas insurance is a mechanism designed to compensate for the consequences of accidents. DOT expects to issue a notice of proposed rule making in the near future which addresses financial responsibility and allocation of risk requirements and establishes the basic mechanisms whereby companies may be required to carry insurance. In the meantime, such requirements continue to be imposed case by case pending issuance of the rule.

## III. The Regulatory Environment

The National Space Policy requires that orbital debris mitigation measures be "consistent with mission requirements and cost effectiveness." This same principle should extend to the commercial sector.

Debris mitigation design solutions will result in some added cost or payload penalty. By implementing these solutions during the system design process, these penalties can be kept to a minimum. A requirement to deorbit upper stages, for instance, entails weight and performance changes that increase launch costs. In determining what steps the U.S. Government should take to address the orbital debris problem, it is necessary to consider the economic impact of these commercial regulations on the domestic launch and satellite industries. Unlike the two governmental sectors (civilian and defense), the private, non-governmental sector functions in a highly competitive environment. The cost of orbital debris measures are passed on to the customer. If the same launch requirements are not imposed on foreign competitors in the launch industry, U.S. launch firms may have to operate at a distinct competitive disadvantage. Similarly, added costs can have a direct bearing on the competitiveness of

space-based technologies (e.g., satellite communications) as compared to terrestrial alternatives (e.g., fiber optics communications).

A robust and economically viable commercial satellite and launch sector is a necessary component of the National Space Policy strategy to assure the continuance of U.S. leadership in space. Consistent with this objective, DOT's mission under 49 United States Code subtitle IX, chapter 701 (formerly the Commercial Space Launch Act) (the Act) is to promote and encourage a commercial launch industry. While the Act authorizes regulation of commercial launch activities, DOT's regulatory authority is limited to the extent necessary to ensure compliance with U.S. international obligations and to protect public health and safety, safety of property, and U.S. national security and foreign policy interests.